

COMBINATIONS

- an arrangement or listing of objects in which **order is not important**.

Yum!

If I order a combo meal, it doesn't matter what order the items are placed on my tray, just as long as they're all there.

You can make a chart or tree diagram.

A hot dog can be ordered with 3 toppings from the following toppings: relish, mustard, ketchup and chili. Find all the possible choices of 3 toppings.

<u>Relish</u>	<u>Mustard</u>	<u>Ketchup</u>	<u>Chili</u>	<u>Outcomes</u>
x	x	x		RMK
x	x		x	RMC
x		x	x	RKC
	x	x	x	MKC

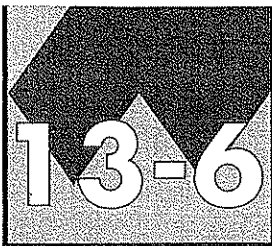
4 different combinations

In general, $C(n,r)$ or nCr , means the # of combinations of n things taken r at a time.

$$C(n,r) \text{ or } nCr = \frac{C(n,r)}{r!}$$

If you have 8 choices of pizza toppings and can choose 3, how many different pizzas can be made?

$$\frac{C(8,3)}{3!} = \frac{8 \times 7 \times 6}{3 \times 2 \times 1} = \frac{336}{6} = 56 \text{ different pizzas with 3 toppings}$$



Study Guide

Combinations

Arrangements or listings in which order is not important are called **combinations**.

Example In how many ways can 3 toppings for a pizza be chosen from a list of 10 toppings?

There are $10 \cdot 9 \cdot 8$ permutations of three toppings chosen from ten.

There are $3!$ or $3 \cdot 2 \cdot 1$ ways to arrange the three toppings.

$$\frac{10 \cdot 9 \cdot 8}{3 \cdot 2 \cdot 1} = \frac{720}{6} \\ = 120$$

There are 120 ways that 3 toppings can be chosen.

Solve.

1. In how many ways can 3 representatives be chosen from a group of 11 people?
2. For an English exam, students are asked to write essays on 4 topics from a list of 8 topics. How many different combinations are possible?
3. In how many ways can a 5-player team be chosen from 16 people?
4. In how many different ways can 8 different colors for a crayon box be selected from 24 color choices?